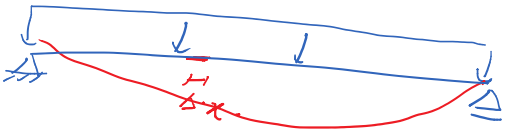
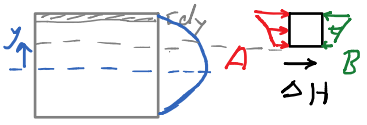
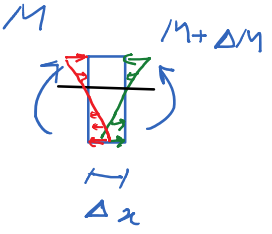
Shear Design

Saturday, April 18, 2020 12:51 PM

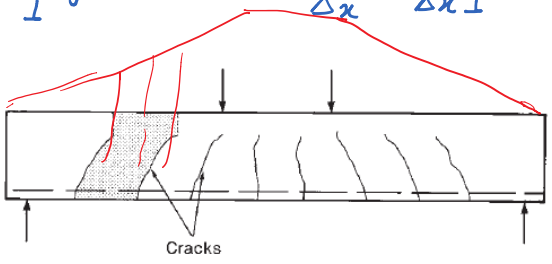


$$\Delta H = \int (\sigma_B - \sigma_A)\, dA = \int \left[\frac{(M+\Delta M)y}{I} - \frac{My}{I}\right] dA$$

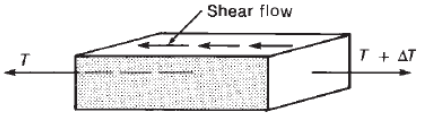




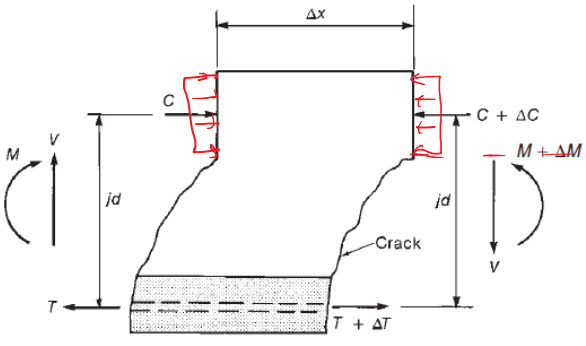
$$\Delta H = \frac{\Delta M}{I}\int y\, dA \rightarrow \frac{\Delta H}{\Delta x} = \frac{\Delta M\, Q}{\Delta x\, I} \rightarrow \boxed{q = \frac{VQ}{I}} \qquad b \qquad \tau = \frac{VQ}{Ib}$$



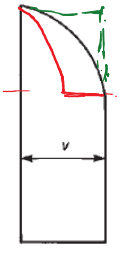
(a) Cracked beam.

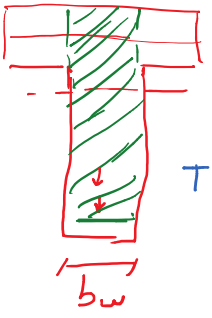


(c) Bottom part of beam.



(b) Portion of beam between two cracks.





(d) Average shear stresses.

$$T = \frac{M}{jd}$$

$$T + \Delta T = \frac{M+\Delta M}{jd}$$

$$\frac{\Delta T}{\Delta x} = \frac{\Delta M}{\Delta x\, jd} \rightarrow \boxed{q = \frac{V}{jd}} \qquad * \tau = \frac{V}{jd\, b_w} \qquad jd \cong 0.9d \qquad d_v$$

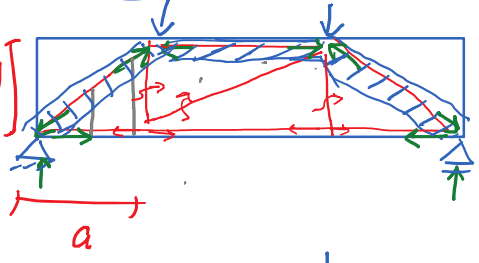
$$\text{ACI}: v = \frac{V}{b_w d} \rightarrow V = v\, b_w d$$

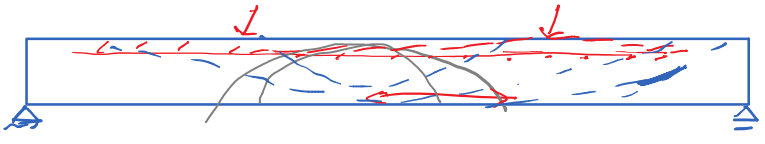
$$V = \frac{dM}{dx} = \frac{d}{dx}(T\, jd) = jd\,\frac{dT}{dx} + T\,\frac{d(jd)}{dx}$$

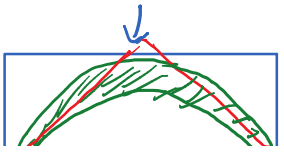
① jd : Constant $\rightarrow$ $V = jd\, q$ Beam action

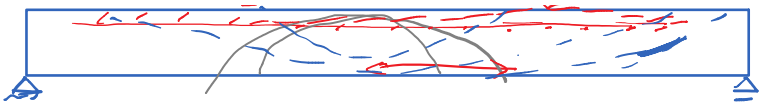
② T : Constant $\rightarrow$ $V = T\,\frac{d(jd)}{dx}$ Arch action

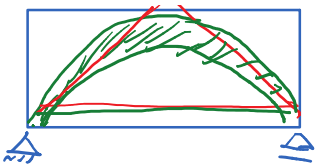
بررسی دو حالت حدی :

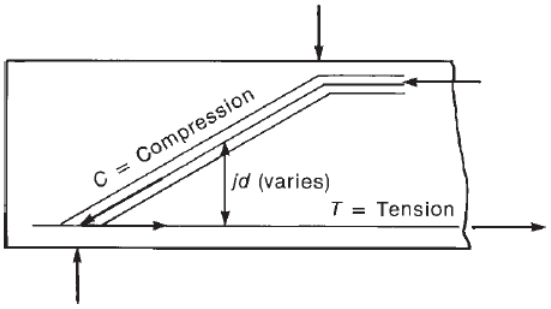


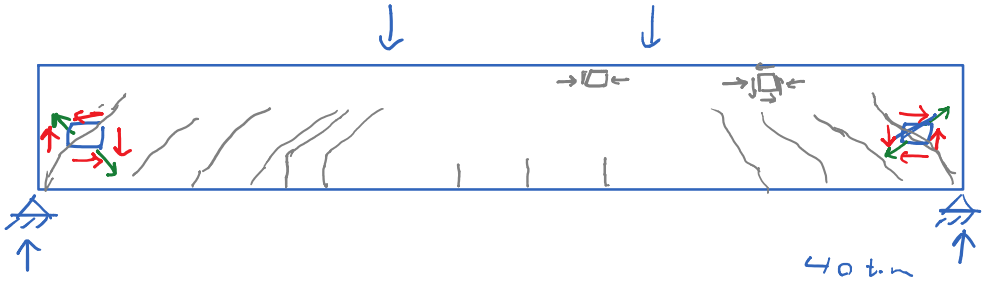




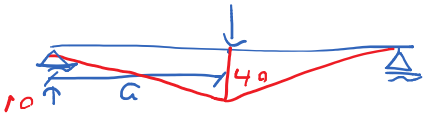




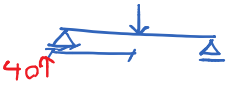




40 t.m



$\frac{P}{2} a = M$



$\frac{P}{2}$

$a = \frac{M}{V}$

$\frac{a}{d} \rightarrow$